

HIJING and pQCD predictions of hadron spectra *

Xin-Nian Wang

We will present estimates of hadron spectra in central $Au + Au$ collisions at RHIC energy from perturbative QCD parton models (for high p_T spectra) and HIJING model (for dN_{ch}/dy). Since there are many nuclear effects (including the formation of QGP) which we still don't quantitatively understand, the extrapolation from $p\bar{p}$ data at the RHIC energy and $p + A$, $A + A$ data at SPS energy is inevitably rigged with uncertainties. We will try to estimate these uncertainties by considering different scenarios of various nuclear effects, like nuclear parton shadowing and jet quenching due to parton energy loss in dense matter. For definiteness, central collisions are restricted to events with impact parameters smaller than 3 fm.

Such uncertainties are significantly larger in $Au + Au$ collisions as

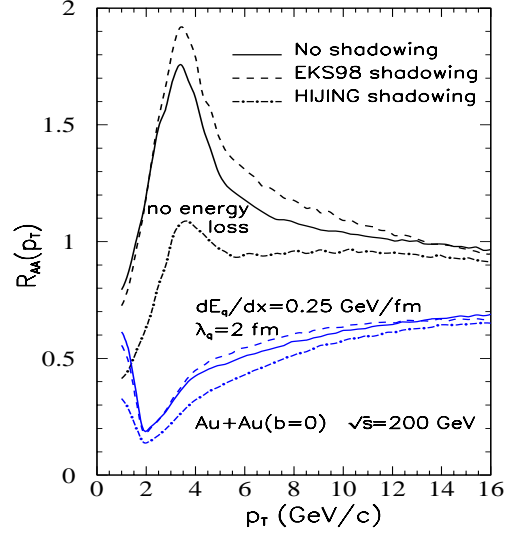
Shown in the first figure are ratios

$$R_{AA}(p_T) = \frac{d\sigma_{AA}/dyd^2p_T}{\langle N_{binary} \rangle dN_{pp}/dyd^2p_T} \quad (1)$$

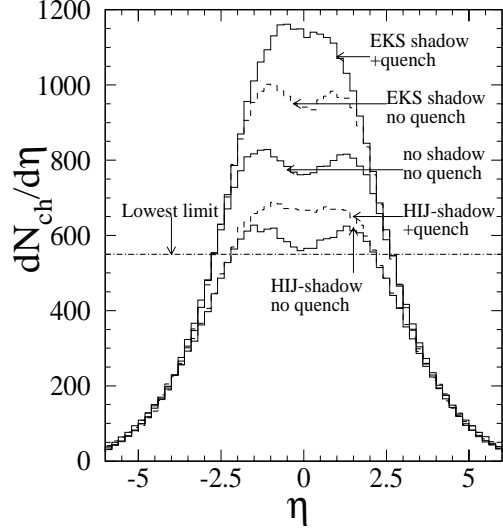
of the p_T spectra with (lower set curves) and without (upper set) parton energy loss.

are plotted and $\langle N_{binary} \rangle$ is the averaged number of binary NN collisions in $A + A$ collisions from the nuclear geometry.

Shown in the second figure are estimates of $dN_{ch}/d\eta$ from HIJING with different parametrizations of shadowing. Uncertainties due to effect of jet quenching are also shown with or without parton energy loss. Including all these effects, there are an uncertainty of about a factor of 2 in the final $dN_{ch}/d\eta$. Taken the value of $dN_{ch}/d\eta = 2.5$ in $p\bar{p}$ collisions at the RHIC energy and assuming the A -scaling at RHIC energy is the same as at SPS ($PbPb/pp \approx 250$), one has the lowest limit of $dN_{ch}/d\eta = 550$ consistent with the HIJING's lowest estimate. The clarification of jet quenching from high p_T spectra and of the shadowing from $p + A$ data will help to narrow down the uncertainty and help us to understand the experimental value of $dN_{ch}/d\eta$.



Ratio of hadron spectra in central $Au + Au$ and pp collisions as defined in Eq. 1



$dN_{ch}/d\eta$ in central $Au+Au$ collisions. EKS [?] and HIJ [?] parametrizations of parton shadowing are used. $dE/dx = 1$ GeV/fm is used for jet quenching scenario.

*To appear in proceedings of QM'99.